

ABSTRACT OF THE DISCLOSURE

A system for sensing a characteristic of a sample may include a tunable source configured to emit optical radiation that varies over a wavelength range at a sweep frequency and a reference source configured to emit optical radiation at a reference wavelength. A first modulator may be configured to modulate the first optical radiation at a first frequency, and a second modulator may be configured to modulate the second optical radiation at a second frequency that is different from the first frequency and the sweep frequency. A science detector may be configured to detect the optical radiation from the first modulator and the second modulator after interaction with the sample and generate a science signal. A number of lock-in amplifiers may be respectively configured to generate components of the science signal that are present at the first and second frequencies. A processor may be configured to determine a characteristic of the sample based on the components of the science signal that are present at the first and second frequencies.